

## Original Article

# The Prevalence of Human Immunodeficiency Virus Infection and the Perceptions of Sexually Transmitted Infections among Homeless Women

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## INTRODUCTION

Sexually transmitted infections (STIs) are among the most common infections in adults and a major health concern globally.<sup>[1]</sup> STIs, especially human immunodeficiency virus (HIV) infection, impede socioeconomic progress in developing countries.<sup>[2]</sup> In 2016, 1.8 million new cases of HIV infection were identified, and therefore, at the end of the year, the total number of people with HIV infection or acquired immunodeficiency syndrome (AIDS) reached 36.9 million.<sup>[3]</sup> The Iranian Ministry of Health and Medical Education reported that 73,000 people with HIV infection lived in Iran in 2015,<sup>[4]</sup> and the Joint United Nations Program on HIV/AIDS estimated that the number of HIV-infected people in Iran was 66,000–126,000 at the end of 2016.<sup>[5]</sup>

### ABSTRACT

**Background:** Homeless women can provide valuable information about the prevalence of sexually transmitted infections (STIs), especially human immunodeficiency virus (HIV) infection, in Iran. However, they are not readily accessible for epidemiological studies and hence, there is limited information about HIV infection prevalence among them. **Objectives:** The aim of the present study was to assess the prevalence of HIV infection and the perceptions of STIs among homeless women in Tehran, Iran. **Methods:** This cross-sectional study was conducted in 2014. Participants were 241 homeless women who were recruited through quota sampling from twelve drop-in centers and night shelters affiliated to a local welfare organization in Tehran, Iran. Data were collected using the perception of STIs Questionnaire as well as serological testing for HIV infection using DS-EIA-HIV-Ag/Ab-Screen kit (manufactured in Italy). Descriptive statistics measures and the independent-samples *t*-test were used for data description and analysis. **Results:** The prevalence of HIV infection was 8.3%. There were significant differences between HIV-positive and HIV-negative women respecting their overall STI risk perception ( $P = 0.003$ ) and its two subscales, namely insufficient knowledge ( $P = 0.007$ ) and inconsistent condom use ( $P = 0.030$ ).

**Conclusion:** Homeless women have low STI risk perception. Training and counseling programs are necessary to improve their STI-related knowledge, perception, and attitudes.

**KEYWORDS:** Homeless women, Human immunodeficiency virus, Sexually transmitted infections

Compared with men, women are biologically, socially, and economically more susceptible to STIs. Biologically, women are at greater risk for STIs due to the direct contact of vaginal mucus membranes to semen during sexual intercourse.<sup>[6]</sup> The greater socioeconomic risk to STIs among women is also due to their more limited access to safe-sex resources and also their more limited decision-making power to use protective methods during intercourse. Moreover, gender inequalities, poverty, and sexual and emotional abuse also put women at greater risk for STIs.<sup>[7]</sup>

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Homelessness, especially among women, is another major global health concern. In Iran, homelessness has become prevalent in recent years due to factors such as population growth, social boundaries for women, modernization, increased divorce rate, domestic violence, and weakened religiosity.<sup>[8]</sup> Alterations in sexual behaviors among homeless women can play an important role in the transmission of STIs especially HIV infection.<sup>[8,9]</sup> Currently, Iran is at a critical stage in the HIV epidemic because HIV-infected people and homeless women are not readily accessible to healthcare systems and HIV epidemiology researchers.<sup>[8]</sup>

STI prevention is an important goal of healthcare programs and government policies. A key step to effective STI prevention is to obtain an accurate understanding of the prevalence and risk factors of STIs as well as women's perceptions of them.<sup>[10]</sup> However, there is limited information about Iranian homeless women's perceptions of STIs and their susceptibility to them.

Nurses and midwives are in good positions to provide quality services to improve health outcomes among people with STIs. Beside their routine tasks (such as history taking and patient education), nurses and midwives who practice in the area of STI care are also engaged in providing HIV-related care services such as education and counseling before and after HIV test results.<sup>[11]</sup>

Despite researches on STI prevalence in Iran,<sup>[12-14]</sup> it is still unknown that what perceptions homeless women have about HIV infection and how much prevalent HIV infection is among them.

## Objectives

The aim of the present study was to assess the prevalence of HIV infection and the perceptions of STIs among homeless women in Tehran, Iran.

## METHODS

### Study design and participants

This cross-sectional study was conducted from March 5 to September 31, 2014. The population of the study consisted of homeless women in drop-in centers and night shelters in Tehran, Iran. Women were included in the study if they were Iranians, aged 15–45, had been sexually active in the last 12 months and were able to understand and speak Persian.

Women were recruited through quota sampling. Accordingly, the province of Tehran was divided into the three northern, southern, and central districts. Then, four drop-in centers or night shelters were randomly selected from each district. After that, 20 homeless women were selected from each center or shelter.

Sample size was calculated with a confidence level of 0.95, an estimated STI prevalence of 10%,<sup>[15]</sup> and a *d* of 0.04. Therefore, the sample size estimation equation indicated that the minimum required sample size was 216. However, to reduce the effects of measurement errors (related to blood sampling and testing), we recruited 245 women to the study. Four patients were excluded due to inaccurate blood testing and thus, the study was completed with 241 women.

### Data collection

Study data were collected using the perception of STIs Questionnaire<sup>[16]</sup> and serological testing. The questionnaire was developed based on the findings of our qualitative study<sup>[17]</sup> and an unpublished literature review. The primary version of the questionnaire contained 56 items.

Content validity of the questionnaire was assessed through qualitative and quantitative methods. During qualitative content validity assessment, some revisions were made to the grammar, wording, and allocation of the items based the recommendations of a panel of experts. For quantitative content validity assessment, content validity ratio (CVR) and content validity index (CVI) were calculated.<sup>[18]</sup> CVR and CVI of the questionnaire were 0.97 and 0.93, respectively. Face validity was also assessed qualitatively and quantitatively. In qualitative face validity assessment, 40 homeless women were asked to assess the items respecting their difficulty and ambiguity.<sup>[16]</sup> Then, in the quantitative face validity assessment, item impact score was calculated for each item (through multiplying the number of women who rated that item important by the importance score of that item); the range of impact score for items was 1.5–5.

For reliability assessment, the internal consistency of the questionnaire was assessed through calculating Kuder–Richardson correlation coefficient. The coefficient for the questionnaire was 0.85, denoting its great internal consistency. Moreover, the test-retest method was employed to assess stability. Initially, 25 homeless women completed the questionnaire twice with a 2-week interval and then, intraclass correlation coefficient was calculated, which was equal to 0.86. This coefficient showed that the questionnaire had excellent stability.<sup>[19]</sup>

The final version of the questionnaire contained 45 items in three subscales, namely perceived risk, insufficient knowledge, and inconsistent condom use. Items were rated on a 3-point response scale. Possible answers to items were “Yes” (scored 1), “No” (scored 0), and “I don't know” (scored 0). Therefore, the total score of the questionnaire could be 0–45. Of course, the total score was changed into a 0–100 scale and interpreted as high STI risk (scores 0–33.33), moderate STI risk (scores

33.34–66.66), and low STI risk (scores 66.67–100). Besides the total score, subscale scores were also calculated.

### Blood sampling for serological testing

Venous blood samples were collected for serological testing. Before venipuncture, we ensured participants that the procedure will be done under the sterile condition and informed them about the probability of a small bruising at venipuncture site. Participants could access the results of serological testing on will. Blood samples were sent for serological testing to Avicenna Research Institute affiliated to Shahid Beheshti University of Medical Sciences, Tehran, Iran. Samples were tested for HIV using the enzyme-linked immunosorbent assay (ELISA) method and DS-EIA-HIV-Ag/Ab-Screen kit (manufactured in Italy) which has a 100% sensitivity and 99.6% specificity. With each series of ELISA kit, a positive and a negative control sample was also included to verify the accuracy of testing. The cutoff value was “0.15 + NC,” where NC was the mean of negative absorbance. If the result was greater than the cutoff value, it was interpreted as positive and vice versa. All positive samples were retested using the Western blot test.

### Ethical considerations

Participants were provided with clear explanations about study purpose and background, voluntariness of participation in and withdrawal from the study, and confidential management of the data. All of them provided written informed consent. The Ethics Committee of Avicenna Research Institute, Tehran, Iran, approved the study (with the code of 93.1272).

### Data analysis

Sociodemographic characteristics, STI risk perception scores, and HIV prevalence were described using the measures of descriptive statistics such as frequency, percentage, mean, and standard deviation). Moreover, the independent samples *t*-test was performed to compare HIV-infected and non-HIV-infected participants respecting the mean scores of STI risk perception and its subscales, namely perceived risk, insufficient knowledge, and inconsistent condom use.  $P < 0.05$  were considered significant. All statistical analyses were performed using SPSS version 16.0 software (SPSS Inc., Chicago, IL., USA).

## RESULTS

In total, 241 homeless women completed study questionnaires and provided venous blood samples. Table 1 shows their characteristics. The prevalence of HIV infection among participants was 8.3% [Table 2].

**Table 1: Homeless women’s sociodemographic characteristics**

Characteristics	Frequency (%)
Age (years)	
Range, mean±SD	15-45, 32.30±7.70
<20	20 (8.3)
21-30	80 (33.2)
31-40	101 (41.9)
>40	40 (16.6)
Education level	
Primary	65 (27.0)
Secondary	68 (28.2)
Diploma	96 (39.8)
University	12 (5.0)
Marital status	
Divorced	121 (50.2)
Single	34 (14.1)
Widowed	16 (6.6)
Married	70 (29.1)
Having a child	
Yes	174 (72.2)
No	67 (27.8)
Primary income resource	
Family support	74 (30.7)
Sex work	60 (24.9)
Begging	20 (8.3)
Employment	16 (6.7)
Selling drugs	13 (5.4)
Criminal activities	2 (0.8)
Other (included street peddling, getting government subsidy)	56 (23.2)

SD: Standard deviation

**Table 2: Prevalence of human immunodeficiency virus among homeless women**

HIV diagnostic laboratory tests	Positive, <i>n</i> (%)
First ELISA	21 (8.7)
Second ELISA	20 (8.3)
Western blot confirmatory test	20 (8.3)

HIV: Human immunodeficiency virus, ELISA: Enzyme-linked immunosorbent assay

The mean score of women’s perception of STIs was  $13.96 \pm 8.7$ , with a range of 0–36. Around 82.5% of women (199 cases) perceived low STI risk, 9.13% (22 cases) perceived moderate STI risk, and only 8.3% (20 cases) perceived high STI risk. Table 3 shows homeless women’s scores of STI perception.

The results of independent sample *t*-test [Table 4] illustrated that HIV-negative women obtained significantly higher scores for the STI perception questionnaire ( $P = 0.003$ ) and two of its subscales, namely insufficient knowledge ( $P = 0.007$ ) and inconsistent condom use ( $P = 0.03$ ).

Barriers to consistent condom use among our participants were use of other contraceptive methods (15%), partner's refusal of condom use (13.3%), interest and trust in partner (10.4%), decreased sexual pleasure due to condom use (5.8%), embarrassment at condom use (5.8%), physical side effects of condom use (4.6%), having only monogamous relationships (4.6%), an opinion indicating that only sex workers should use condom (3.3%), and lack of access to condom (1.2%). Participants had several high-risk behaviors which predisposed them to HIV infection. These behaviors are summarized in Table 5.

## DISCUSSION

The study results showed that the prevalence of HIV infection among homeless women was 8.3%. Around 82.6% of participants perceived that they were at low risk for developing STIs, while only 8.3% of them (two cases) perceived high STI risk. Results also indicated that HIV positivity had significant relationships with overall STI risk perception and its insufficient knowledge and inconsistency condom use subscales. However, it had no significant relationship with the perceived risk subscale of STI risk perception. Moreover, participants reported several HIV risk factors including injection drug abuse,

**Table 3: Scores of sexually transmitted infection risk perception**

Risk perception	Possible range	Range of women's scores	Mean±SD	High perception (low risk), n (%)	Moderate perception (moderate risk), n (%)	Low perception (high risk), n (%)
Overall	0-45	0-36	13.96±8.71	20 (8.3)	22 (9.1)	199 (82.6)
Insufficient knowledge subscale	0-28	0-24	10.64±6.40	32 (13.3)	105 (43.6)	104 (43.2)
Inconsistent condom use subscale	0-9	0-9	2.36±3.57	68 (28.2)	0	173 (71.8)
Perceived risk subscale	0-8	0-4	1±1	0	0	241 (100)

**Table 4: Comparison of risk perception scores by HIV status**

Risk perception	Mean±SD		Independent-samples <i>t</i> -test
	HIV positive	HIV negative	
Overall	9.88±7.63	14.49±8.74	<i>t</i> =2.9, <i>P</i> =0.003
Insufficient knowledge subscale	7.17±6.21	10.97±6.34	<i>t</i> =2.7, <i>P</i> =0.007
Inconsistent condom use subscale	1.08±2.74	2.45±3.61	<i>t</i> =2.2, <i>P</i> =0.030
Perceived risk subscale	0.65±1.02	1.04±1.22	<i>t</i> =1.4, <i>P</i> =0.150

SD: Standard deviation, HIV: Human immunodeficiency virus

**Table 5: Homeless women's high-risk behaviors**

Behaviors	n (%)	Sum (%)
Drugs abused		
Crystal	149 (65.3)	228 (100) <sup>a</sup>
Heroin	46 (20.2)	
Injection drugs	4 (1.7)	
Opium	9 (4)	
Marijuana	9 (4)	
Crack	1 (0.4)	
Others (tramadol, methadone, and cocaine)	10 (4.4)	
Number of sexual partners (last year)		
1-3	185 (76.8)	241 (100)
>3	56 (23.2)	
Using drugs before sex (last year)	222 (97.3)	241 (100)
Engaging in sex with a partner who used to inject drugs (last year)	43 (17.8)	228 (100) <sup>a</sup>
Engaging in sex with a partner who injects drugs (now)	36 (14.9)	241 (100)
Engaging in sex with a partner who had several sexual partners (last year)	84 (34.9)	241 (100)
Engaging in sex with a partner who has several sexual partners (now)	54 (22.4)	241 (100)
Engaging in sex with a partner who is HIV positive (now)	2 (0.8)	241 (100)
Engaging in sex with a partner with hepatitis B surface antigen positivity (now)	2 (0.8)	241 (100)
Lack of condom use in sexual activities (usually)	173 (71.8)	241 (100)
Lack of condom use in sexual activities (last year)	104 (43.2)	241 (100)
Tattoos (last year)	102 (42.3)	241 (100)

<sup>a</sup>228 homeless women used drugs. HIV: Human immunodeficiency virus

sex work, and having a husband who used to inject drugs. However, none of the HIV-positive women knew how they had become infected with HIV.

HIV prevalence was reported to be 15.2% among Iranian injection drug users,<sup>[20]</sup> 7.4% among female sex workers,<sup>[21]</sup> and 2.1% among Iranian prisoners.<sup>[22]</sup> Although the World Health Organization reported HIV prevalence in Iran to be more than 5% among high-risk populations,<sup>[23]</sup> our findings showed that HIV prevalence among homeless women was as high as 8.3%. This finding may reflect the greater prevalence of high-risk behaviors and lower HIV risk perception among homeless women compared with other high-risk populations. A study in 2009 on female prisoners in Isfahan, Iran, also found that 31% of them had a history of drug injection and 18.4% of them had engaged in illicit sex even though none of them was HIV positive.<sup>[24]</sup> Another study in Iran showed that some women may decide on sex work for income or food in desperate conditions such as homelessness.<sup>[25]</sup>

We also found that most homeless women perceived low STI risk. Moreover, STI risk perception had a significant relationship with HIV positivity, so that HIV-positive women perceived lower STI risk than their HIV-negative counterparts. Similarly, an earlier study in Iran showed that higher perceived STI risk was associated with greater protection against STIs during sexual activities.<sup>[26]</sup> In our study, HIV-positive women were older, less educated, and engaged in higher risk-taking behaviors than HIV-negative women. The previous studies suggest that older women have a lower level of awareness about STIs than young women,<sup>[27]</sup> suggesting HIV prevention programs may be more hidden to them. In addition, older women report unwillingness to use condoms because of reduced fertility and decreased the probability of pregnancy.<sup>[28]</sup> In addition, older women face emotional-psychological changes, including depression, loneliness, and discomfort and are therefore perhaps more likely to continue living in harmful relationships than younger women.<sup>[14,28,29]</sup> On the other hand, HIV-negative women have better access to HIV prevention information and participate more actively in HIV prevention programs, increasing their awareness of STIs. However, as HIV-positive women were already infected, they may not have felt the need to participate in prevention programs.

Findings also showed that a majority of participants had limited knowledge about STIs. Moreover, most of them were aware that HIV is transmitted through contaminated syringes and blood, vaginal intercourse, and self-mutilation. Yet, only one-third of them knew that HIV transmission could also occur through breastfeeding and unprotected anal or oral sex. HIV-positive women in our study also had limited

knowledge about STIs and most of them reported poor living conditions and limited access to basic healthcare services and social facilities. Limited STI knowledge and awareness are important risk factors for developing STIs.<sup>[30]</sup> The knowledge of most participants was identified as low primarily because of limited school education. Reduced educational opportunities may have limited the provision of information and education about sexually transmitted diseases to the younger generation. The stigma associated to high-risk behaviors might have negatively affected the participant's access to information in this regard.<sup>[31]</sup> Politicians and public policymakers should address the needs of this group of women in the field of education and other health and welfare services and provide support for their return to the family environment. Most homeless women in this research left school early, and recent studies suggest that linkages between school and family provide protection for a wide range of risky behaviors for teenagers,<sup>[32]</sup> therefore, preventing early school departure as well as supporting return to school initiatives can be considered as useful HIV and STI preventative strategies.

Most women in the present study perceived that they were at low risk for STIs. Therefore, only 8.3% of them used to suggest their sexual partners to use condom. There are a number of reasons why the homeless women perceived themselves to be at low risk for STI infection. For example, low education,<sup>[33]</sup> lack of reliable education in the family and other educational centers,<sup>[32]</sup> running away from the family,<sup>[34]</sup> low knowledge about STIs and high-risk behaviors.<sup>[35]</sup> Other reasons that may help explain this include obtaining sexual health information from unreliable sources (e.g., risky friends or relatives),<sup>[36]</sup> inaccurate social, moral, and religious beliefs, and low perceived sensitivity are the most common reasons for low-risk perception for STIs among homeless women.<sup>[31]</sup>

Moreover, study findings showed that the mean score of the perceived risk subscale of STI risk perception among HIV-positive women was not significantly different from that of HIV-negative women. Perceived risk is a subjective judgment and plays an important role in promoting protective behaviors. However, many other factors may contribute to perceived risk, most of which are still poorly understood. Although some studies have shown the positive relationship between risk perception and protective behaviors, some others reported no significant relationship or even an inverse relationship between them.<sup>[37,38]</sup>

STI care programs are growing globally. Nurses and midwives are responsible to provide STI care services to vulnerable populations, especially those who are less likely to access or attend primary care settings.<sup>[39]</sup> STI

care includes health education, counseling, and referral;<sup>[40]</sup> thus, nurses and midwives can play important roles in providing educations and counseling to high-risk populations such as homeless women. Involving drop-in centers and night shelters in the process of care services delivery can improve the effectiveness of STI care services. Although nurses and midwives play significant roles in competently and autonomously providing safe and quality care to STI-afflicted people in the world,<sup>[41]</sup> STI care services have so far been neglected in the Iranian healthcare system. Our findings highlight the necessity of developing strategies and policies for effective STI care services and public education in Iran to reduce STI burden for homeless women.

This study faced some limitations. Homeless women are highly stigmatized in Iran and are hard to reach for most researchers. Therefore, the majority of our participants were initially reluctant to participate in the study due to the sensitivity of the study subject matter. To overcome this limitation, we spent a considerable amount of time in the study setting to hold training workshops for women and provide them with counseling services. Thereby, they finally trusted us and agreed to participate in the study. Another limitation of the study was that during venous blood sampling for serological testing, some participants fainted and therefore, we needed to stop sampling and call for emergency medical services. Moreover, some women had collapsed veins and hence, taking blood sample from them was difficult. Besides, as the data were collected through questionnaires, social desirability bias might have affected participants' responses to questionnaire items. As this was a cross-sectional study, the found relationships between STI risk perception and HIV positivity do not necessarily indicate causality. The last limitation was that training and counseling services provided to study participants for attracting their trust in the research might have affected their perceptions of STIs.

## CONCLUSION

This study shows that homeless women have limited knowledge and inaccurate perceptions of STI risk and therefore, they are greatly at risk for STIs, chiefly HIV infection. Planning and implementing STI prevention programs are recommended to empower homeless women for self-care and STI prevention. Moreover, both government and nongovernment organizations need to support homeless women by providing them with better accommodation facilities. Homeless women's limited knowledge about STI transmission may be due to social, moral, and religious beliefs about homelessness. Moreover, homeless women's limited knowledge about STI implies that public education

through media and individual counseling may help improve people's perceptions, knowledge, and attitudes about the transmission of STIs, especially HIV, and significantly contribute to their prevention. The results of this study provide valuable information to develop and implement effective STI prevention programs and can help nurses and midwives who are in direct contact with high-risk populations to provide more effective education and counseling to their vulnerable clients. Health policy-makers are recommended to focus on nurse- and midwifery-led STI care programs to reduce STI burden in Iran. Such programs and clinics may provide considerable opportunities for STI screening.

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## Conflicts of interest

There are no conflicts of interest.

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